

09/826,148

IN THE CLAIMS:

The following is a complete listing of the claims, and replaces all earlier versions and listings.

It is noted that all of the underlining of the variables in the following claims listing are existing parts of the claim text and as such, that underlining is meant to be permanent.

1. (Currently Amended) A method for encoding a source sequence of symbols (u) as an encoded sequence, comprising the steps of:

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1. performing a first operation of division into sub-sequences and encoding, consisting of dividing the source sequence (u) into p_1 first sub-sequences (U_j), p_1 being a positive integer, and encoding each of the first sub-sequences (U_j) using a first circular convolutional encoding method;

2. performing an interleaving operation of interleaving the source sequence (u) into an interleaved sequence (u*); and

3. performing a second operation of division into sub-sequences and encoding, including dividing the interleaved sequence (u*) into p_2 second sub-sequences (U'_j), p_2 being a positive integer, and encoding each of the second sub-sequences (U'_j) using a second circular convolutional encoding method, and wherein

at least one of the integers p_1 and p_2 being strictly greater than 1 and at least one of the first sub-sequences (U_j) not being interleaved into any of the second sub-sequences (U'_j).

2. (Previously Presented) The encoding method according to Claim 1, in which said first or second circular convolutional encoding method includes:

a pre-encoding step, of defining an initial state of said encoding method for the sub-sequence in question, so as to produce a pre-encoded sub-sequence, and
a circular convolutional encoding step.

3. (Previously Presented) The encoding method according to Claim 2, in which said pre-encoding step for one of the first sub-sequences (U_i) and said circular convolutional encoding step for another one of the first sub-sequences (U_j) already pre-encoded are performed simultaneously.

4. (Previously Presented) The encoding method according to any one of the preceding claims, in which the integers p_1 and p_2 are equal.

5. (Previously Presented) The encoding method according to any one of Claims 1-3, in which sizes of all the sub-sequences are identical.

6. (Previously Presented) The encoding method according to any one of claims 1-3, in which said first and second circular convolutional encoding methods are identical.

7. (Previously Presented) The encoding method according to any one of Claims 1-3, further comprising steps according to which:

an additional interleaving operation is performed, of interleaving a parity sequence (v_i) resulting from said first operation of dividing into sub-sequences and encoding; and

a third operation is performed, of division into sub-sequences and encoding, including dividing the interleaved sequence, obtained at the end of the additional interleaving operation, into p_3 third sub-sequences (U''_i), p_3 being a positive integer, and encoding each of the third sub-sequences (U''_i) using a third circular convolutional encoding method.

8. (Previously Presented) A device for encoding a source sequence of symbols (u) as an encoded sequence, comprising:

first means for dividing into sub-sequences and encoding, for dividing the source sequence (u) into p_1 first sub-sequences (U_i), p_1 being a positive integer, and for encoding each of the first sub-sequences (U_i) using first circular convolutional encoding means;

interleaving means for interleaving the source sequence (u) into an interleaved sequence (u^*); and

second means for dividing into sub-sequences and encoding, for dividing the interleaved sequence (u^*) into p_2 second sub-sequences (U'_i), p_2 being a positive integer, and for encoding each of the second sub-sequences (U'_i) using second circular convolutional encoding means, at least one of the integers p_1 and p_2 being strictly greater than 1 and at least one of the first sub-sequences (U_i) not being interleaved into any of the second sub-sequences (U'_i).

9. (Currently Amended) The encoding device according to Claim 8, in which said first or second circular convolutional encoding means have:

pre-encoding means, for defining an initial state of said encoding means for the sub-sequence in question, so as to produce a pre-encoded sub-sequence, and circular Convolutional convolutional encoding means.

10. (Previously Presented) The encoding device according to Claim 9, in which said pre-encoding means process one of the first sub-sequences (U_i) at the same time as said circular convolutional encoding means process another of the first sub-sequences (U_j) already pre-encoded.

11. (Previously Presented) The encoding device according to Claim 8, 9 or 10, in which the integers p_1 and p_2 are equal.

12. (Previously Presented) The encoding device according to any one of Claims 8 to 10, in which sizes of all the sub-sequences are identical.

13. (Previously Presented) The encoding device according to any one of Claims 8 to 10, in which said first and second circular convolutional encoding means are identical.

14. (Previously Presented) The encoding device according to any one of Claims 8 to 10, further comprising:

additional interleaving means, for interleaving a parity sequence (v_1) supplied by said first means for dividing into sub-sequences and encoding; and third means for dividing into sub-sequences and encoding, for dividing the interleaved sequence, supplied by said additional interleaving means, into p_3 third sub-sequences (U''_i), p_3 being a positive integer, and for encoding each of said third sub-sequences (U''_i) using third circular convolutional encoding means.

15. (Previously Presented) A method for decoding a sequence of received symbols, adapted to decode a sequence encoded by an encoding method according to any one of Claims 1 to 3.

16. (Previously Presented) The decoding method according to Claim 15, using a turbodecoding, in which there are performed iteratively:

a first operation of dividing into sub-sequences, applied to the received symbols representing the source sequence (u) and a first parity sequence (v_1), and to the a priori information (w_4) of the source sequence (u); for each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, a first elementary decoding operation, adapted to decode a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the source sequence (u);

an operation of interleaving the sequence (w₁) formed by the sub-sequences of extrinsic information supplied by said first elementary decoding operation;

a second operation of dividing into sub-sequences, applied to the received symbols representing the interleaved sequence (u*) and a second parity sequence (v₂), and to the a priori information (w₂) of the interleaved sequence (u*);

for each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, a second elementary decoding operation , adapted to decode a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the interleaved sequence (u*);

an operation of deinterleaving the sequence (w₃) formed by the extrinsic information sub-sequences supplied by said second elementary decoding operation.

17. (Previously Presented) A device for decoding a sequence of received symbols, adapted to decode a sequence encoded using an encoding device according to any one of Claims 8 to 10.

18. (Currently Amended) The decoding device according to Claim 17, using a turbodecoding, comprising:

first means for dividing into sub-sequences, applied to the received symbols representing the source sequence (u) and a first parity sequence (v₁), and to a priori information (w₄) of the source sequence (u);

first elementary decoding means, operating on each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, for decoding a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the source sequence (u);

means for interleaving the sequence (w₁) formed by the sub-sequences of extrinsic information supplied by said first elementary decoding means (404);

second means for dividing into sub-sequences, applied to the received symbols representing the interleaved sequence (u^{*}) and a second parity sequence (v₂), and to the a priori information (w₂) of the interleaved sequence (u^{*});

second elementary decoding means, operating on each triplet of sub-sequences representing a sub-sequence encoded by a circular convolutional code, for decoding a sequence encoded by a circular convolutional code and supplying a sub-sequence of extrinsic information on a sub-sequence of the interleaved sequence (u^{*});

means for deinterleaving the sequence (w₃) formed by the sub-sequences of extrinsic information supplied by said second elementary decoding means (406),

said means of dividing into sub-sequences, of elementary decoding, of interleaving and of deinterleaving operating iteratively.

19. (Previously Presented) A digital signal processing apparatus, having means adapted to implement an encoding method according to any one of Claims 1 to 3.

20. (Previously Presented) A digital signal processing apparatus, having an encoding device according to any one of Claims 8 to 10.

21. (Previously Presented) A telecommunications network, having means adapted to implement an encoding method according to any one of Claims 1 to 3.

22. (Previously Presented) A telecommunications network, having an encoding device according to any one of Claims 8 to 10.

23. (Previously Presented) A mobile station in a telecommunications network, having means adapted to implement an encoding method according to any one of Claims 1 to 3.

24. (Previously Presented) A mobile station in a telecommunications network, having an encoding device according to any one of Claims 8 to 10.

25. (Previously Presented) A device for processing signals representing speech, having an encoding device according to any one of Claims 8 to 10.

26. (Previously Presented) A data transmission device having a transmitter adapted to implement a packet transmission protocol, and an encoding device according to any one of Claims 8 to 10.

27. (Previously Presented) A data transmission device according to
Claim 26, in which the protocol is of an Asynchronous Transfer Mode type.

28. (Previously Presented) A data transmission device according to
Claim 26, in which the protocol is of an Internet Protocol type.

29. (Previously Presented) Information storage means, which can be
read by a computer or microprocessor storing instructions of a computer program,
implementing an encoding method according to any one of Claims 1 to 3.

30. (Previously Presented) Information storage means, which can be
read by a computer or microprocessor storing instructions of a computer program,
implementing a decoding method according to Claim 15.

31. (Previously Presented) Information storage means, which is
removable, partially or totally, which can be read by a computer or microprocessor storing
instructions of a computer program, implementing an encoding method according to any
one of Claims 1 to 3.

32. (Previously Presented) Information storage means, which is
removable, partially or totally, which can be read by a computer or microprocessor storing
instructions of a computer program, implementing a decoding method according to Claim
15.

33. (Previously Presented) A computer program containing sequences of instructions, implementing an encoding method according to any one of Claims 1 to 3.

34. (Previously Presented) A computer program containing sequences of instructions, implementing a decoding method according to Claim 15.